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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/786,173	05/21/2001	Nathalie Laurent-Chatenet	136.157	6495

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EXAMINER	
LU, TOM Y	

ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 09/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/786,173	LAURENT-CHATENET ET AL.	
	Examiner	Art Unit	
	Tom Y. Lu	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9,10 and 12-23* is/are rejected.

7)☒ Claim(s) *7,8 and 11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Request for Continued Examination filed on 07/26/2005 has been entered.

2. Upon entry of Request for Continued Examination, the amendment filed on 4/26/2005 has been entered and considered.

3. Claims 1, 4, 6-8, 10-11 and 15 have been amended.

4. Claims 1-23 are pending.

Response to Arguments

5. Applicant's arguments, see Remarks, filed on 04/26/2005, with respect to the rejection(s) of claim(s) 1 under 35 U.S.C. 103 (a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Huang, "A New Motion Compensation Method for Image Sequence Coding Using Hierarchical Grid Interpolation", IEEE Transactions On Circuits and Systems For Video Technology, Vol. 4, No. 1, February 1994, pgs 42-52.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-6, 9-10 and 19-23are rejected under 35 U.S.C. 102(b) as being anticipated by Huang ("A New Motion Compensation Method for Image Sequence Coding Using Hierarchical

Grid Interpolation", IEEE Transactions On Circuits and Systems For Video Technology, Vol. 4, No. 1, February 1994, pgs 42-52).

a. Referring to Claim 1, Huang discloses a method for estimating movement (page 45, right column, line 9) between two numerical images, I_1 and I_2 (previous frame and current frame are the claimed two numerical images, page 45, right column, line 11), having luminances Y_1 and Y_2 (page 47, left column, lines 30 and 32, $I_{k-1}(x,y)$ and $I_k(x,y)$ for previous frame and current frame), respectively, for generating for each point of coordinates x, y of the image I_2 a movement vector $\vec{d}(x,y) = (d_{x1} d_y)$ to form an image $\hat{I}_2$ (page 47, left column, line 32,predicted image of the current frame $\hat{I}_k(\mu,\nu)$) that is an approximation of the image I_2 with a luminance $\hat{Y}_2(x,y) = Y_1(x - d_{x1}, y - d_y)$ from the image I_1 (see equation 9, on page 47, left column), wherein the method comprises the following steps: (a) defining an initial model of finished elements, the model comprising a mesh having nodes that are points of the image I_2, a movement vector associated with each node of the mesh, and an interpolation formula for calculating the value of the movement vector of each point of the image I_2 from the values of the movement vectors of the nodes of the mesh to which the image I_2 belongs (page 47, right column, HGI algorithm section, steps 1 and 2, the initial model is the quadtree structure with at least one CP and at least 4 mesh cells, the examples of nodes are grid points shown in figures 5 and 6. The movement vectors are DVs. The interpolation formula is bilinear interpolation), (b) globally optimizing the

values of all the movement vectors of the initial model or a final model according to a differential method to refine the initial model or the final model (page 48, left column, lines 1-5, step 3, the differential method is synthesizing the predicted image with the current frame to calculate total square error), (c) calculating a variation E between the image $\hat{I}_2$ and the image I_2 for each finished element or mesh (page 48, left column, step 4), (d) carrying out a finer meshing on a discrete fraction of all the finished elements determined according to a criterion relating to the variation E and allocating a movement vector to each new mesh node to define the final model of finished elements (page 48, left column, step 5); (e) repeating steps (b), (c) and (d) on the final model of finished elements obtained at the end of the preceding step (d) until a stoppage criterion is satisfied (page 48, left column, steps 6 and 7).

b. Referring to Claim 2, Huang discloses wherein the finished elements are classified in a decreasing order of the variation E of each finished element and X first finished elements of the classification are subdivided into smaller finished elements to carry out a finer meshing on a discrete fraction of the finished elements in step (d), wherein X represents a predetermined fraction of the number of finished elements in the model (see figure 4, the grid points with letter representations, such as B, C, D, etc, are X finished elements with further subdivisions).

c. Referring to Claim 3, Huang discloses wherein to carry out a finer meshing on a discrete fraction of the finished elements in step (d), the variation E calculated in

step © for each finished element is compared with a threshold variation that depends on a size of the finished element in question, and each of the finished elements having a variation E greater than the threshold variation is subdivided into smaller finished elements (page 48, left column, last two paragraphs).

d. Referring to Claim 4, Huang discloses wherein the stoppage criterion comprises a predetermined number of finished elements constituting the model of finished elements defined by step (d) (page 50, left column, line 7, threshold is 300 grid points).

e. Referring to Claim 5, Huang discloses wherein the stoppage criterion is satisfied when the variations E of the finished elements defined by step (d) are smaller than a functional threshold variation that depends on a size of the finished elements in question (page 48, left column, step 6).

f. Referring to Claim 6, Huang discloses wherein for each numerical image I_1 and I_2, a set of R images I_i^r with a level of resolution r and luminance Y_i^r is defined, with r taking the values (0,...R-1) and i taking the values 1 and 2 is defined, the images I_1^0 and I_2^0 corresponding to the numerical images I_1 and I_2, and in that the steps (b) to (e) are carried out for each resolution level r from the level r=R-1 to the level r=0 (see figures 4-6, in figure 4, there are three resolution levels, and the steps (b)-(e) are carried out for each resolution level).

g. Referring to Claim 9, Huang discloses wherein the movement vectors are nil vectors when the initial model is defined (in any motion estimating process, the

initial model of the first frame contains nil vectors because the movements are created by the following frames).

h. Referring to Claim 10, Huang discloses similar equation at page 48, equation 11 or 14.

i. Referring to Claim 19, Huang discloses wherein the meshing carried out on the discrete fraction of the finished element, in step (d) is associated with a partially quaternary tree in which each level represents a meshing level and each node represents a triangle of the given level, and wherein a binary train describing the tree is generated for coding the images (see figure 4).

j. Referring to Claim 20, Huang discloses wherein the movement vectors associated with each node of the tree are encoded differentially with respect to the movement vectors of a father node when the father node exists, and wherein the movement vectors are ordered in the binary train along a width passage of the tree (all of these are inherent characteristics of hierarchal encoding as shown in figure 4).

k. Referring to Claim 21, Huang discloses wherein the meshing carried out on the discrete fraction of the finished elements in step (d) is associated with a partially quaternary tree in which each level represents a meshing level and each node represents a triangle of the given level, and wherein the tree is generated from a binary train of encoded data describing the tree for decoding the images (see explanation in Claim 19, and for every receiving end, there is decoder for decoding the binary train to restore the image).

l. Referring to Claim 22, Huang discloses wherein the encoded data relating to a given level of the tree is collectively regrouped in the binary train to generate the tree level by level as the binary train is read (it is inherency in hierarchical structure encoding).

m. Referring to Claim 23, Huang discloses wherein at least one of range belongs to a group consisting of the following ranges: compression of sequences of image, and compression of data in spaces larger than 2 (Huang's method is applicable in video compression environment).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 12-18 rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Takahashi et al (U.S. Patent No. 5,396,437). The arguments in Paragraph 6 above as to the applicability of Huang are incorporated herein.

a. Referring to Claim 12, Huang does not explicitly teach the differential method for optimizing the movement vector is Gauss-Newton method. Huang teaches the movement vectors are determined by interpolation at page 47, right column, last 2 lines. Takahashi at column 4, lines 20-25, teaches the interpolation method can be carried out by various techniques one of them is Gauss-Newton. At the time the invention was made, it would have been obvious to a person of ordinary skill in

the art to use Gauss-Newton method to optimize the movement vectors because it is merely one of many alternative techniques for mathematical calculation.

b. With regard to Claim 13, Marquardt extension of the Gauss-Newton method is just another alternative mathematical optimization calculation that a person of ordinary skilled in the art would be motivated to adapt.

c. With regard to Claim 14, the compactness constraint is an inherently feature when applying Lagrangian technique for optimization, which is taught in Takahashi, and the motivation for using Lagrange interpolation technique for movement vector calculation is the same as Claim 13.

d. With regard to Claim 15, the equation is Lagrange interpolation equation.

e. With regard to Claim 16, see explanation in Claim 14.

f. With regard to Claim 17, see explanation in Claim 14.

g. With regard to Claim 18, the use of an LDL profile technique is just another alternative mathematical optimization calculation that a person of ordinary skilled in the art would be motivated to adapt.

Allowable Subject Matter

8. Claims 7—8 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y. Lu whose telephone number is (571) 272-7393. The examiner can normally be reached on 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571)-272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JOSE L. COUSO
PRIMARY EXAMINER

Tom Y. Lu